

## ABSTRACT OF THE DISCLOSURE

A scanning evanescent microwave microscope (SEMM) that uses near-field evanescent electromagnetic waves to probe sample properties is disclosed. The SEMM is capable of high resolution imaging and quantitative measurements of the electrical properties of the sample. The SEMM has the ability to map dielectric constant, loss tangent, conductivity, electrical impedance, and other electrical parameters of materials. Such properties are then used to provide distance control over a wide range, from microns to nanometers, over dielectric and conductive samples for a scanned evanescent microwave probe, which enable quantitative non-contact and submicron spatial resolution topographic and electrical impedance profiling of dielectric, nonlinear dielectric and conductive materials. The invention also allows quantitative estimation of microwave impedance using signals obtained by the scanned evanescent microwave probe and quasistatic approximation modeling. The SEMM can be used to measure electrical properties of both dielectric and electrically conducting materials.